



**Ministério da Saúde**  
**Instituto Nacional de Câncer**  
**Coordenação de Ensino**  
**Programa de Residência Médica em Radiologia e Diagnóstico por Imagem**

**LUIZ ALBERTO COUTINHO DE FREITAS LIMA**

**ENTRE DUCTOS E DILATAÇÕES: O PAPEL DO RADIOLOGISTA NO  
DIAGNÓSTICO DAS NEOPLASIAS INTRADUCTAIS PANCREÁTICAS**

**Rio de Janeiro**  
**2026**

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Trabalho de Conclusão de Curso  
apresentado ao Instituto Nacional de  
Câncer como requisito parcial para a  
conclusão do Programa de Residência  
Médica em Radiologia e Diagnóstico por  
Imagem.

Orientadora: Dra. Viviane Brandão Amorim

Revisão: Dra. Shirley Burburan

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2026

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# LUIZ ALBERTO COUTINHO DE FREITAS LIMA

**Entre ductos e dilatações:** o papel do radiologista no diagnóstico das neoplasias intraductais pancreáticas

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Rio de Janeiro

2026

## RESUMO

LIMA, Luiz Alberto Coutinho de Freitas. **Entre ductos e dilatações:** papel do radiologista no diagnóstico das neoplasias intraductais pancreáticas. Trabalho de Conclusão de Curso (Residência Médica em Radiologia e Diagnóstico por Imagem) — Instituto Nacional de Câncer (INCA), Rio de Janeiro, 2026.

As neoplasias mucinosas papilíferas intraductais do pâncreas (IPMN) correspondem a um grupo heterogêneo de lesões císticas pancreáticas caracterizadas pela transformação mucinosa do epitélio ductal, com produção excessiva de mucina e dilatação do ducto pancreático principal e/ou de seus ramos secundários. Essas lesões apresentam potencial variável de malignização, tornando seu correto reconhecimento essencial para o manejo clínico adequado. As IPMN são classificadas em três subtipos principais — ducto principal, ductos secundários e tipo misto —, cada um associado a diferentes riscos de progressão para carcinoma invasivo. A ressonância magnética abdominal associada à colangiopancreatografia por ressonância magnética é o método de imagem de escolha para a avaliação inicial e o seguimento dessas lesões, permitindo caracterizar a comunicação cística com o sistema ductal pancreático, avaliar o calibre do ducto principal e identificar nódulos murais ou componentes sólidos. Achados como dilatação acentuada do ducto pancreático principal, presença de componentes sólidos realçados e icterícia obstrutiva configuram estigmas de alto risco, geralmente indicando tratamento cirúrgico. Por outro lado, critérios preocupantes orientam vigilância radiológica mais estreita e individualizada. O radiologista desempenha papel central na estratificação de risco, no acompanhamento longitudinal e na orientação das decisões terapêuticas, contribuindo de forma decisiva para a detecção precoce de sinais de malignização e para a adequada condução multidisciplinar dos pacientes com IPMN.

Palavras-chave: neoplasias císticas pancreáticas; neoplasias mucinosas papilíferas intraductais; ressonância magnética; colangiopancreatografia por ressonância magnética; diagnóstico por imagem.

## ABSTRACT

LIMA, Luiz Alberto Coutinho de Freitas. **Between ducts and dilations:** the radiologist role in intraductal pancreatic neoplasms. Final paper (Medical Residency in Clinical Radiology and Diagnostic Imaging) — Brazilian National Cancer Institute (INCA), Rio de Janeiro, 2026.

Intraductal papillary mucinous neoplasms (IPMNs) represent a heterogeneous group of pancreatic cystic lesions characterized by mucinous transformation of the ductal epithelium, with excessive mucin production and dilation of the main pancreatic duct and/or its secondary branches. These lesions exhibit a variable potential for malignant transformation, making accurate recognition essential for appropriate clinical management. IPMNs are classified into three main subtypes—main duct, branch duct, and mixed type—each associated with different risks of progression to invasive carcinoma. Contrast-enhanced abdominal magnetic resonance imaging combined with magnetic resonance cholangiopancreatography is the imaging modality of choice for initial evaluation and follow-up, as it allows characterization of cystic communication with the pancreatic ductal system, assessment of main duct caliber, and identification of mural nodules or solid components. Imaging findings such as marked dilation of the main pancreatic duct, the presence of enhancing solid components, and obstructive jaundice constitute high-risk stigmata and generally indicate surgical management. Conversely, worrisome features guide closer and individualized radiologic surveillance. The radiologist plays a central role in risk stratification, longitudinal follow-up, and therapeutic decision-making, contributing decisively to the early detection of malignant transformation and to the appropriate multidisciplinary management of patients with IPMNs.

Keywords: pancreatic cystic neoplasms; intraductal papillary mucinous neoplasms; magnetic resonance imaging; magnetic resonance cholangiopancreatography; diagnostic imaging.



## **Between ducts and dilations: The intriguing world of IPMN**



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## No Disclosures

The present study was approved by The Ethics Research Committee

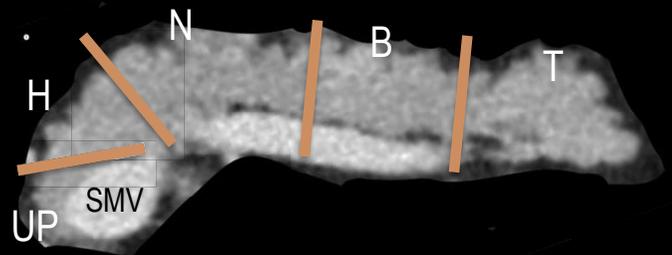
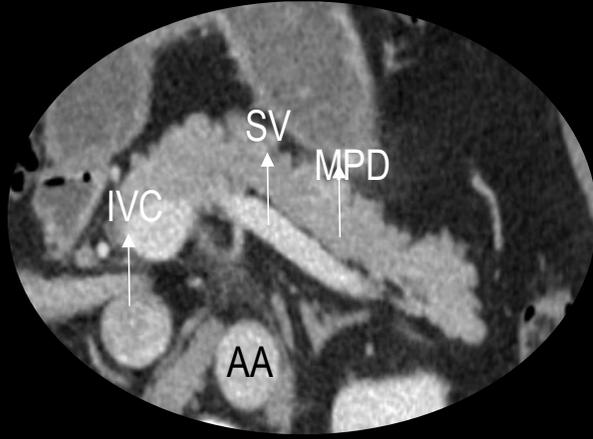
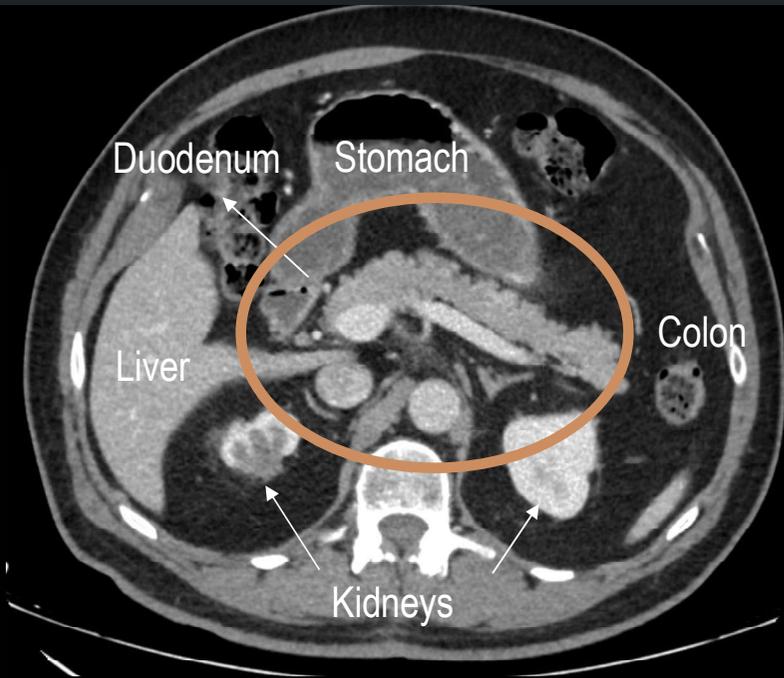
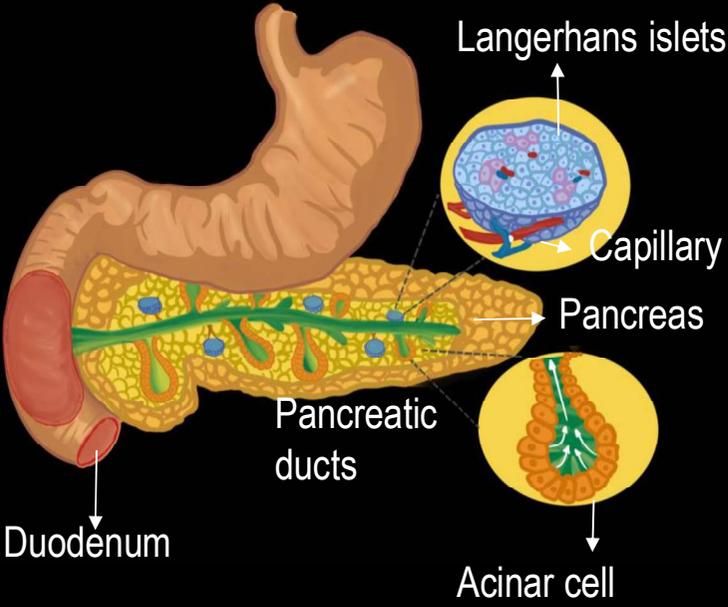
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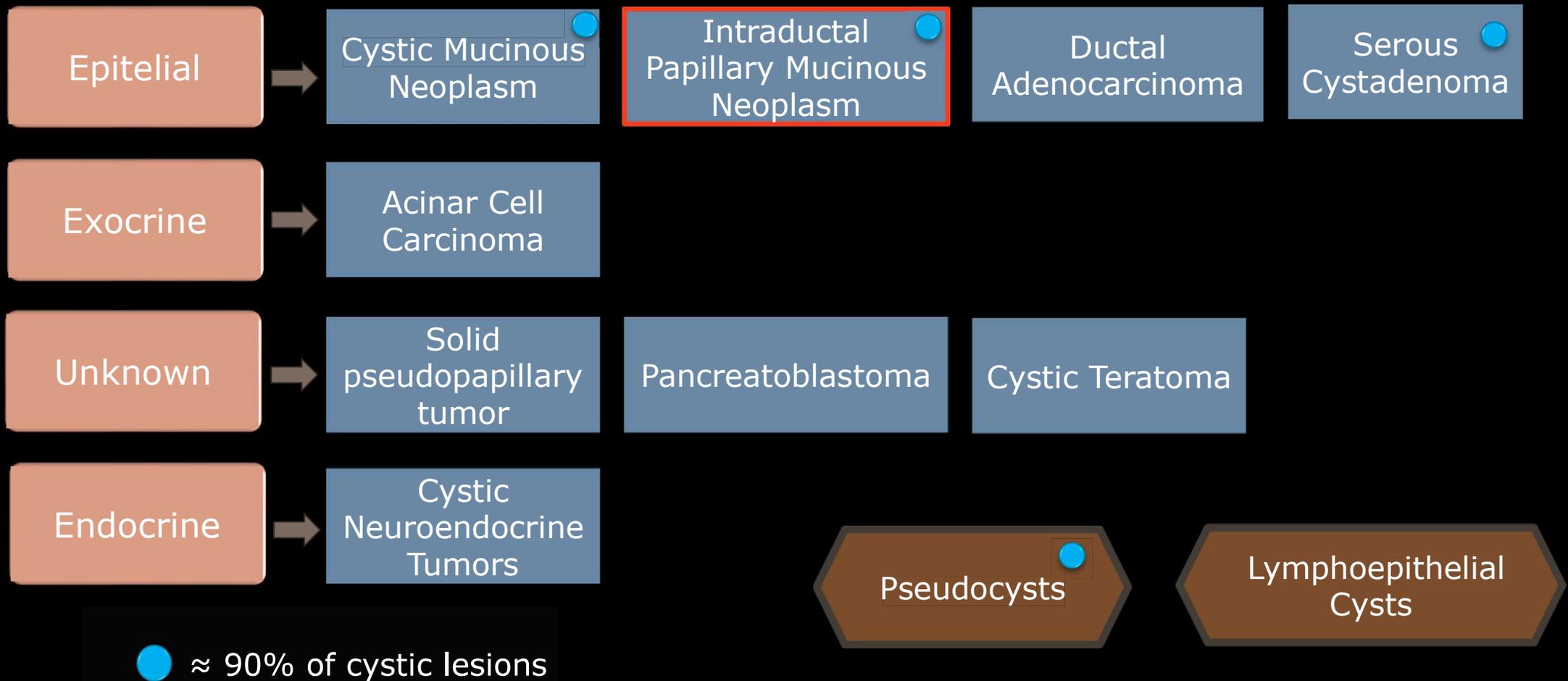
# THE PANCREATIC ANATOMY



IVC: Inferior vena cava  
 SV: Splenic vein  
 MPD: Main pancreatic duct  
 AA: Aorta artery  
 SMV: Superior mesenteric vein

H: Head  
 N: Neck  
 B: Body  
 T: Tail

# WHAT ARE THE MAIN PANCREATIC CYSTIC LESIONS?



# PATHOPHYSIOLOGY OF IPNM'S

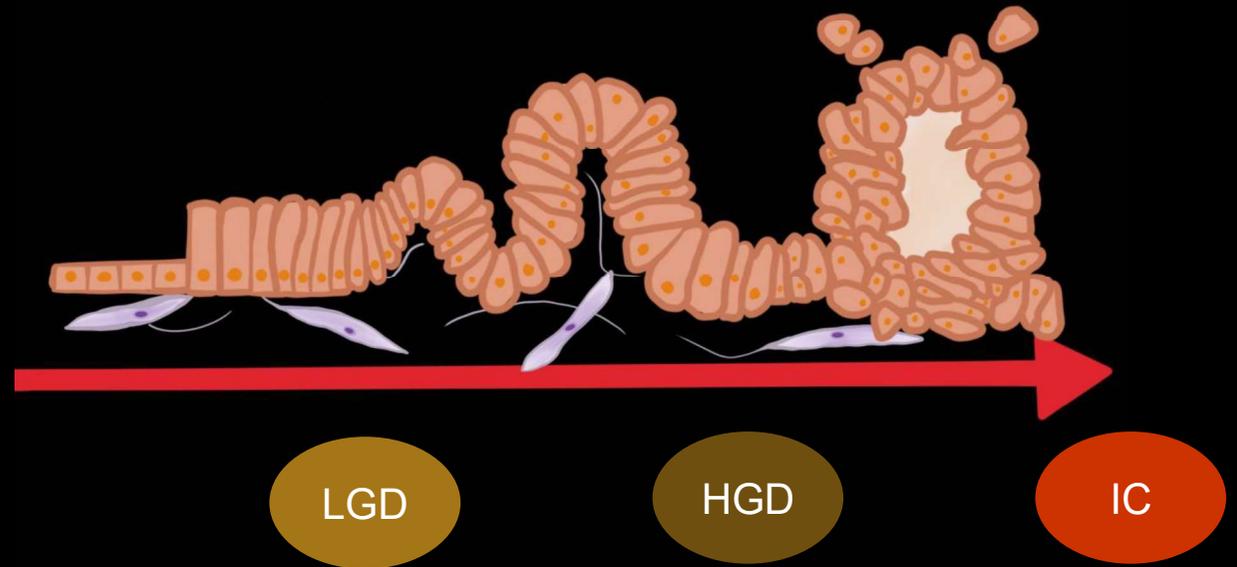
Mucinous Ductal Transformation of the Pancreatic Epithelium



Excessive Production of Viscous Mucin



Dilation of the Main Duct and/or its Secondary Branches



LGD: Low-Grade Dysplasia.  
HGD: High-Grade Dysplasia.  
IC: Invasive Carcinoma.

# MORPHOLOGICAL SUBTYPES OF IPMN

## Gastric

- Typically low-grade dysplasia.
- Most indolent subtype, common in branch duct IPMN

## Intestinal

- Frequently associated with high-grade dysplasia.
- Higher risk of progression to colloid carcinoma (more favorable prognosis).

## Pancreatobiliary

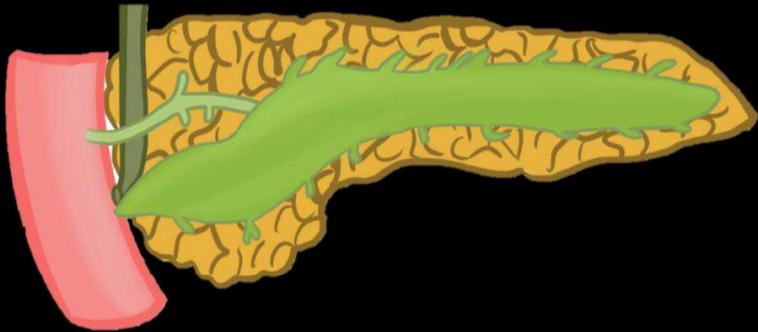
- Higher propensity for ductal adenocarcinoma (less favorable prognosis).

## Oncocytic

- Distinct neoplasm with specific molecular and clinical characteristics.
- Generally less aggressive.

# CLASSIFICATION

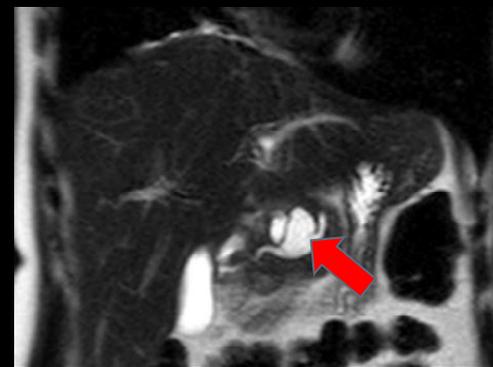
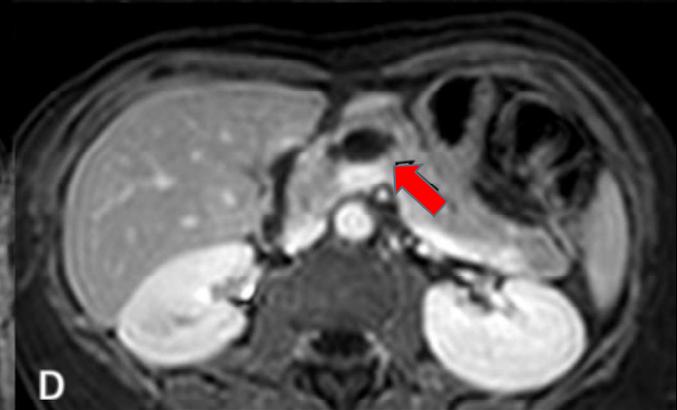
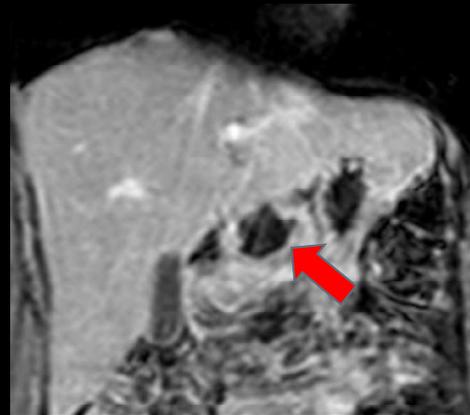
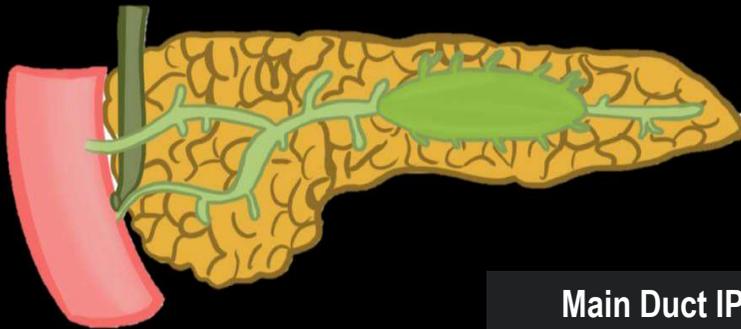
## Main Duct IPMN



**Definition:** Originates in the main pancreatic duct.

**Imaging Characteristics:** Marked dilatation of the main duct; high risk of malignancy.

**Clinical Relevance:** Often requires surgical intervention due to higher malignancy risk.



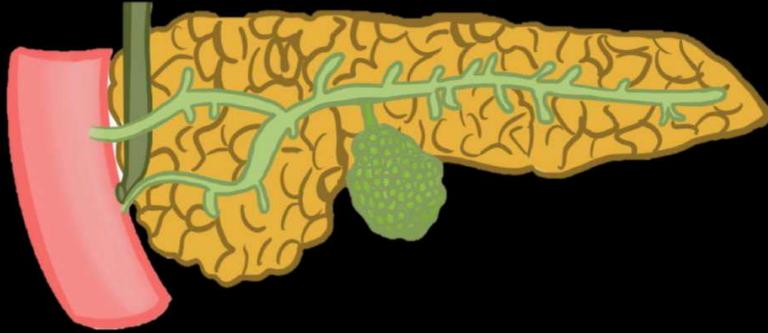
**Main Duct IPMN:** Diffuse or segmental dilation of the main pancreatic duct  $> 5$  mm, without an obstructive factor.

### Branch Duct IPMN:

Cystic dilation of secondary pancreatic duct > 5mm / cluster of cysts;  
Multifocal;  
Head and uncinete process of the pancreas.  
Communication with the main pancreatic duct.

# CLASSIFICATION

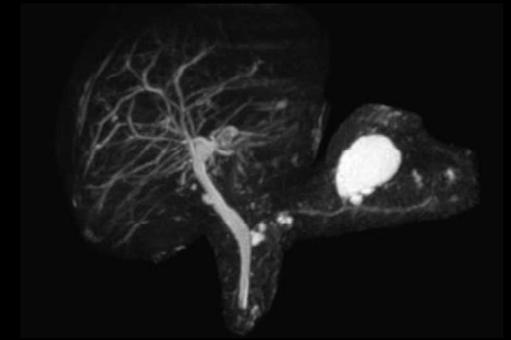
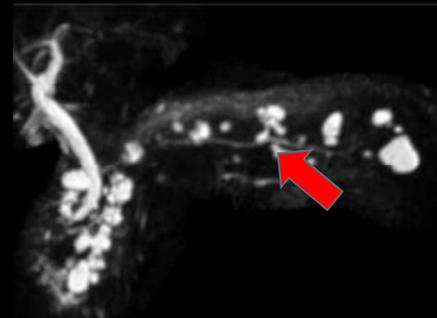
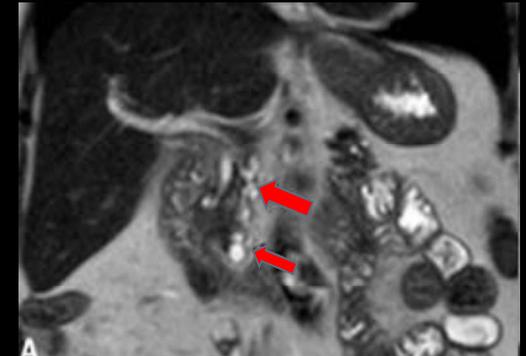
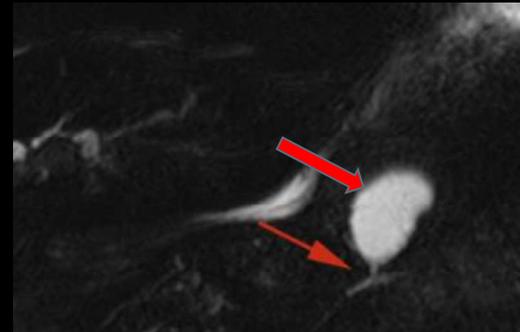
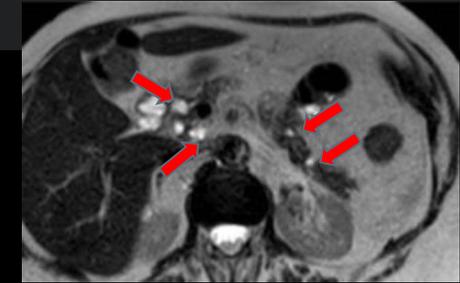
## Branch Duct IPMN



**Definition:** Originates in the side branches of the pancreatic duct

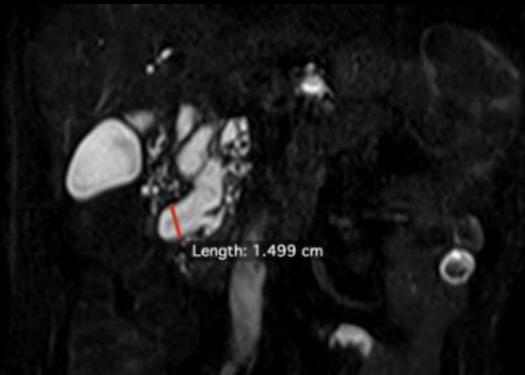
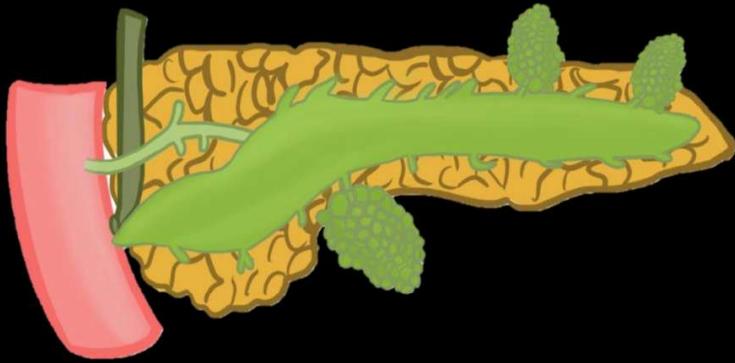
**Imaging Characteristics:** Multiple cystic lesions connected to a mildly dilated main duct; lower risk of malignancy compared to main duct IPMN.

**Clinical Relevance:** May be monitored with regular imaging unless high-risk features are present.



# CLASSIFICATION

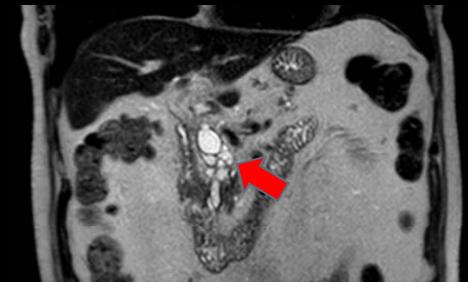
## Mixed Type IPMN



**Definition:** Involves both the main duct and branch ducts.

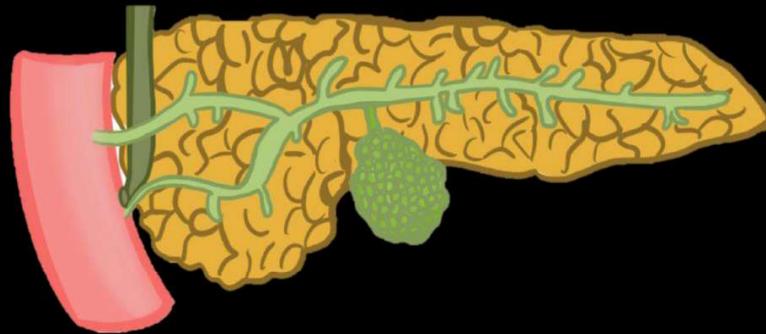
**Imaging Characteristics:** Features of both main duct and branch duct IPMNs; combined risk profile.

**Clinical Relevance:** Management strategies vary depending on the predominant features.



**Mixed IPMN:** Segmental or diffuse dilation of the main pancreatic duct  $> 5$  mm, without an obstructive factor, associated with cystic dilation ( $> 5$  mm) of secondary pancreatic ducts.

# RISK OF MALIGNANCY



Branch Duct IPMN

15% in 5 years

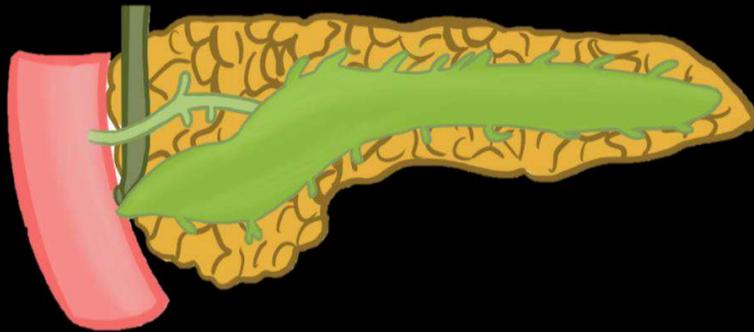
Gastric

Pancreatobiliary

Oncocytic

Intestinal

# RISK OF MALIGNANCY



Main Duct IPMN

63% in 5 years

Gastric

Pancreatobiliary

Oncocytic

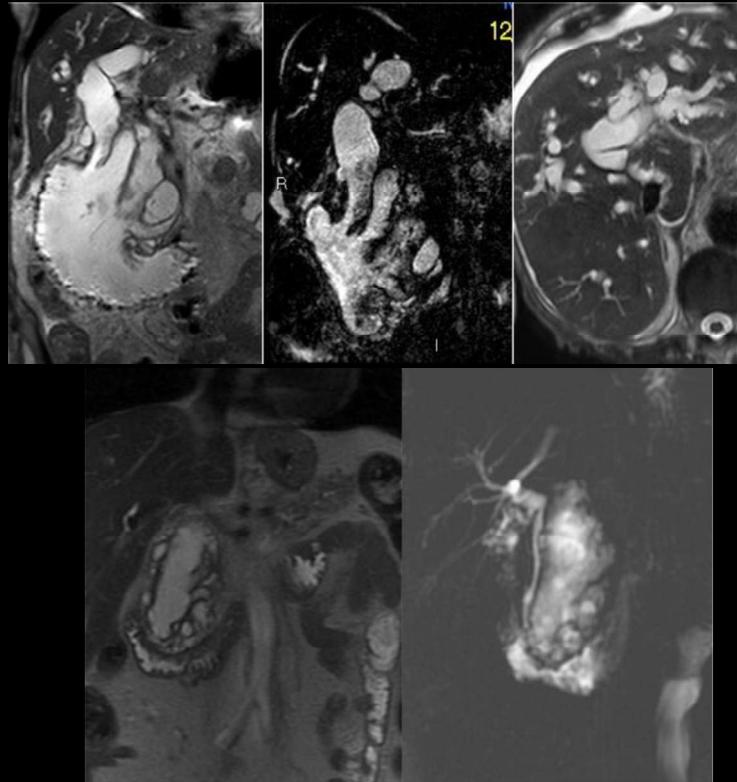
Intestinal

# THE ROLE OF THE RADIOLOGIST

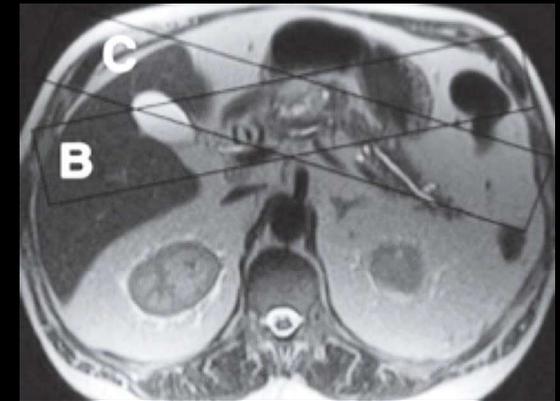
## Narrow down the diagnosis

Upper abdominal MRI  
with contrast  
+  
Magnetic Resonance  
Cholangiopancreatog  
raphy (MRCP)

- Make sure the image acquisition is oriented to the axis of the pancreas
- Evaluate each lesion individually



## Cholangiographic sequences



# HIGH-RISK STIGMATA

Enhancing solid component greater than 5 mm

Main pancreatic duct greater than or equal to 10 mm

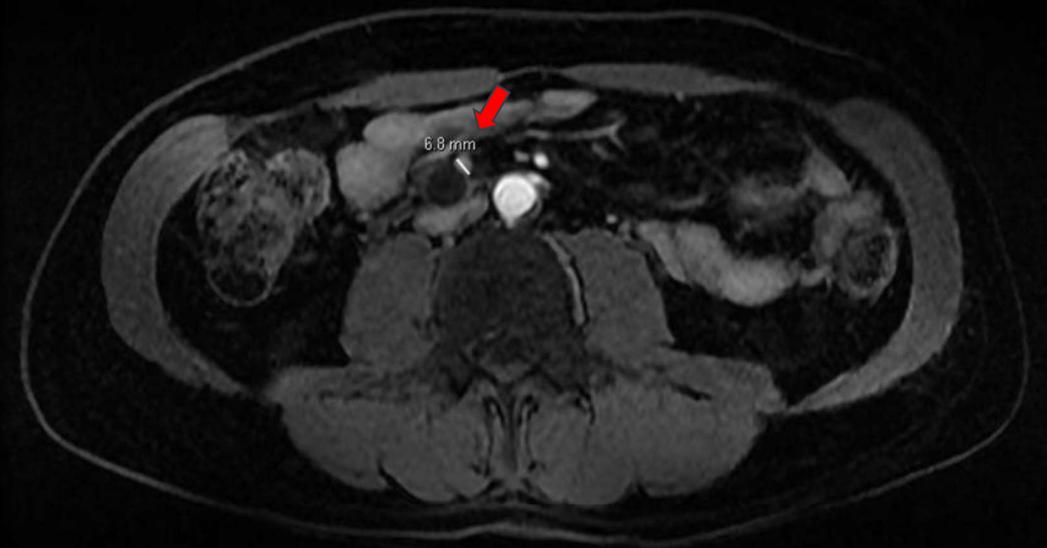
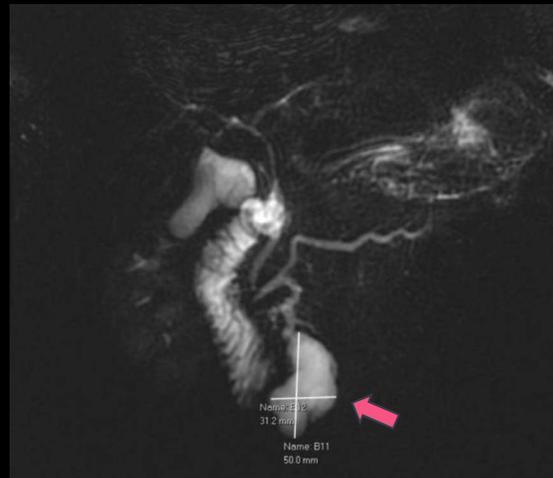
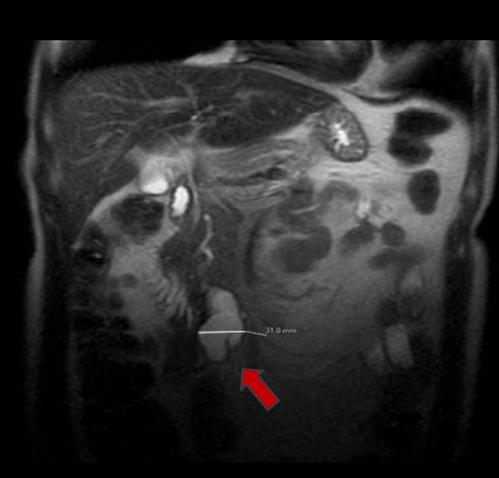
Obstructive jaundice

Suspicious or positive results of cytology

Consider

SURGERY

# HIGH-RISK STIGMATA CASE 1



52-year-old male patient with  
branch type IPNM

Enhancing solid component greater than 5 mm



## HIGH-RISK STIGMATA CASE 2



86-year-old male patient with  
Mixed type IPNM

Enhancing solid component greater than 5 mm 🇺🇸

Main pancreatic duct greater than or equal to 10 mm 🇺🇸

# WORRISOME CRITERIA

Cyst larger than or equal to 3 cm.

Dilation of the main pancreatic duct between 5 and 9 mm

Enhancing mural nodules smaller than 5 mm.

Lymphadenopathy

Abrupt change in the caliber of the pancreatic duct with upstream pancreatic atrophy without discernible obstructive lesion;

Cyst growth rate greater than 2,5 mm in 2 years;

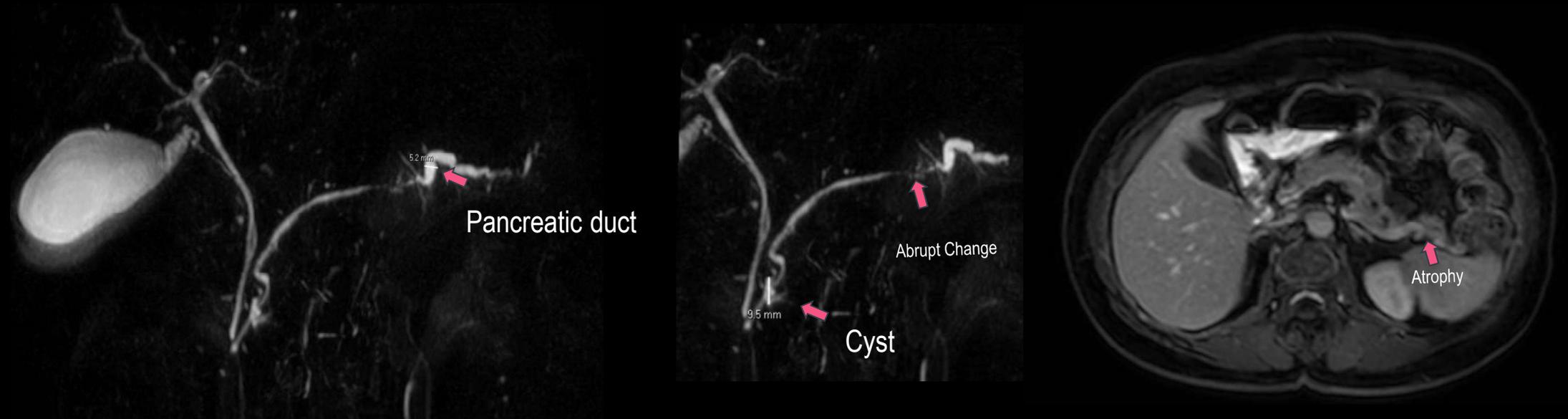
Elevated CA 19-9.

Pancreatitis

New onset or acute exacerbation of DM within the past year

Thickened/enhancing cyst walls

# WORRISOME CRITERIA CASE 1



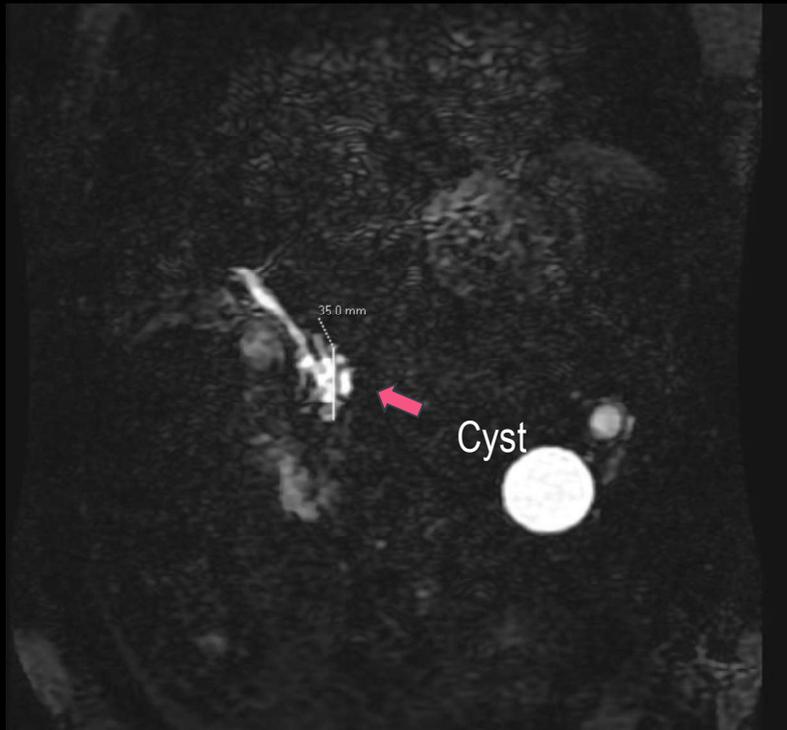
65-year-old female patient with  
Mixed type IPNM

Dilation of the main pancreatic duct between 5 and 9 mm 🙌

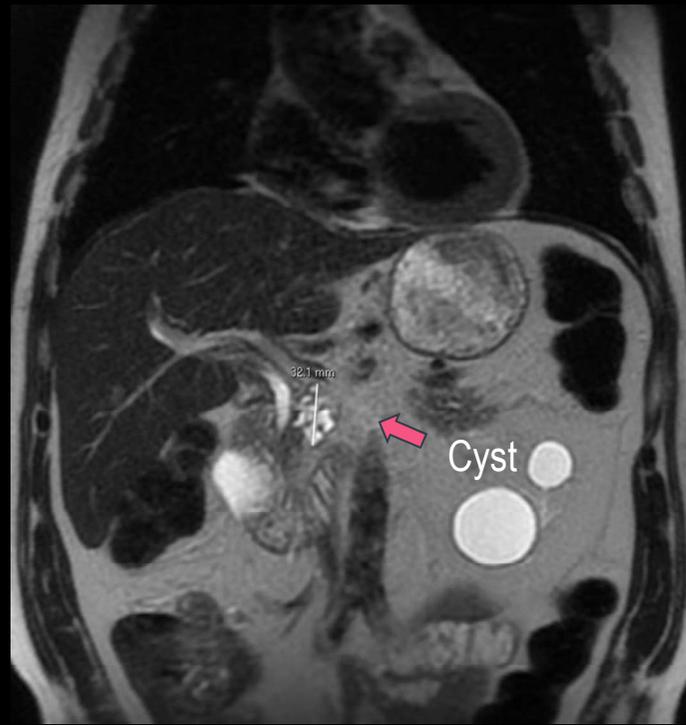
Abrupt change in the caliber of the pancreatic duct with upstream  
pancreatic atrophy without discernible obstructive lesion; 🙌

# WORRISOME CRITERIA CASE 2

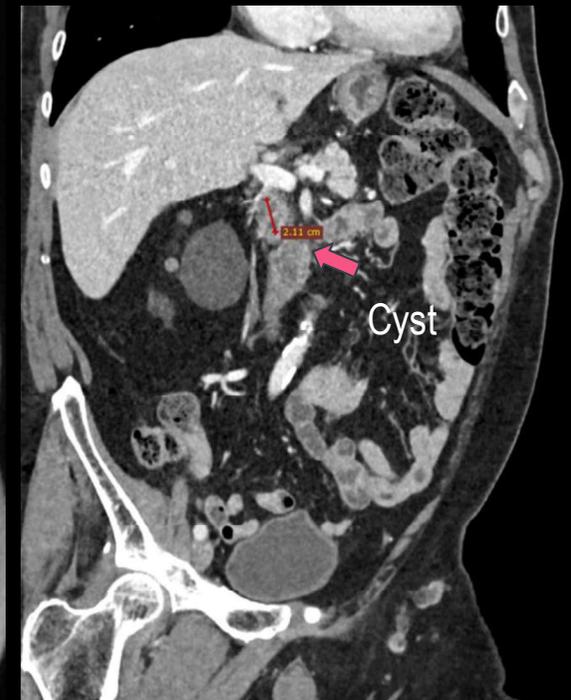
Present Time



Present Time



2 Years earlier CT



79-year-old male patient with  
branch type IPNM

Cyst larger than or equal to 3 cm. 🙌

Cyst growth rate greater than 2,5 mm in 2 years; 🙌

# SIMPLIFIED FLOWCHART

**Are any of the following "high-risk stigmata" for malignancy present?**  
 1. Obstructive jaundice in a patient with a cystic lesion in the head of the pancreas  
 2. Enhancing mural nodule > 5 mm  
 3. Main pancreatic duct > 10 mm

Yes

Consider surgery if clinically feasible.

No

**Are any "worrisome features" present?**  
**Imaging:** Cyst > 3 cm; Enhancing mural nodule < 5 mm; Cyst wall thickening or enhancement; Main duct 5–9 mm; Abrupt change in the caliber of the pancreatic duct with distal pancreatic atrophy; Lymphadenopathy; Increased CA19-9 serum level; Cyst growth rate > 5 mm over 2 years.

Yes

**Are any of the following factors present?**  
 1. Repeated acute pancreatitis to worsen patient's quality of life.  
 2. Multiple worrisome features augmenting the likelihood of HGD/IC.  
 3. Young, fit for surgery

Yes

No

No

What's the size of the largest cyst?

Cyst ≥ 30mm alone?

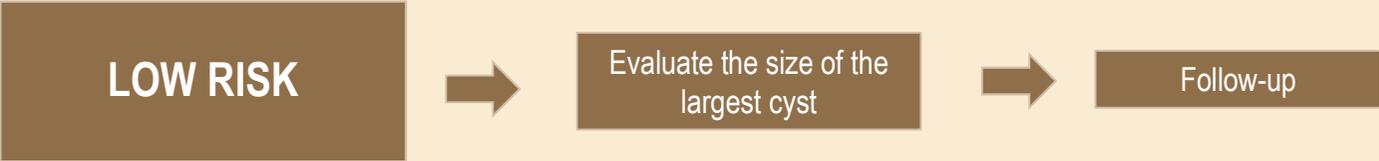
No

Yes

Surveillance with 1-6 month-interval according to estimated risk

Surveillance	
<2 cm	CT/MRI after 6 months. If no changes, every 18 months.
2-3 cm	CT/MRI every 6 months in the first year. If no changes, every year.
>3 cm	Strict surveillance alternating between MRI and EUS every 3-6 months. Consider surgery for young and healthy patients.

# HOW, WHEN, AND FOR HOW LONG TO PERFORM FOLLOW-UP?



<b>&lt;2 cm</b>	CT/MRI after 6 months. If no changes, every 18 months.
<b>2-3 cm</b>	CT/MRI every 6 months in the first year. If no changes, every year.
<b>&gt;3 cm</b>	Strict surveillance alternating between MRI and EUS every 3-6 months. Consider surgery for young and healthy patients.

Follow-up may be discontinued in situations such as:



Cysts < 20 mm, without any high-risk features or worrisome signs, that have remained under surveillance for at least 5 years.

If the patient is not eligible for a surgical procedure or has a life expectancy of < 10 years.

## TAKE HOME MESSAGES

- Upper abdominal MRI with MR cholangiopancreatography (MRCP) are the best exams to evaluate and monitor pancreatic cystic lesions.
- Epidemiological characteristics associated with imaging features help narrow the diagnosis.
- Keep in mind the worrisome features and high-risk stigmata to stratify the risk of lesions with malignant potential.
- Consult one of the proposed guidelines to guide management.

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